

attention: customers installing control panels in the U.S.



subject:

Understanding NEC Requirements for Wiring WATCONNECT® C2-C5 Control Panels

summary:

WATCONNECT® control panels integrate Watlow's high-quality heater, sensor, temperature controller and power controller products for a complete thermal solution. In materials describing the capabilities of the line of control panels, there is a listing of the maximum of 48 amps per circuit. Watlow distributors and customers should fully understand this specification.

The C2-C5 control panels are standardized at **48 amps per branch circuit**, meaning there can be multiple circuits between the control panel and the heater it is controlling. The C2 and C3 panels are built to have two circuits while the C4 and C5 have four. The WATCONNECT family of control panels support from one to 12 branch circuits.

explanation:

The multiple circuit branches spread out the load for important reasons.

- **Regulatory compliance requires it.** National Electric Code - Section 425.22 requires that "equipment rated more than 48 amperes and employing such elements shall have the heating elements subdivided, and each subdivided load shall not exceed 48 amperes." UL® 508A – Section 31.61 requires control panel branch circuit protection "not less than 125 percent of the heater load current and not larger than 60 amperes." Thus, $60 \text{ amps} \times 1 / 125\% = 48 \text{ amps per branch circuit maximum}$.
- **To improve reliability and redundancy.** Watlow's DIN-A-MITE® SCR power controllers utilize an external heat sink to reduce control panel heat rise by approximately 70 percent. Reducing the heat extends the life of the equipment, thereby maximizing reliability and uptime. In the event of a fault, the affected branch circuit(s) is de-energized leaving the remaining heater branch circuits continuing to provide heat. Thus, multiple branch circuits increase redundancy and efficiency for less downtime.
- **Better system cost effectiveness.** Heater and panel sizing near the regulatory limit of 48 amps per branch circuit can provide the lowest system cost.

exception:

For large heaters, NEC and UL® codes provide branch circuit exceptions for ASME-rated and stamped equipment — if specific conditions are met. If satisfied, branch circuits of up to 120 amps may be permissible. Please contact your Watlow sales representative for more information.

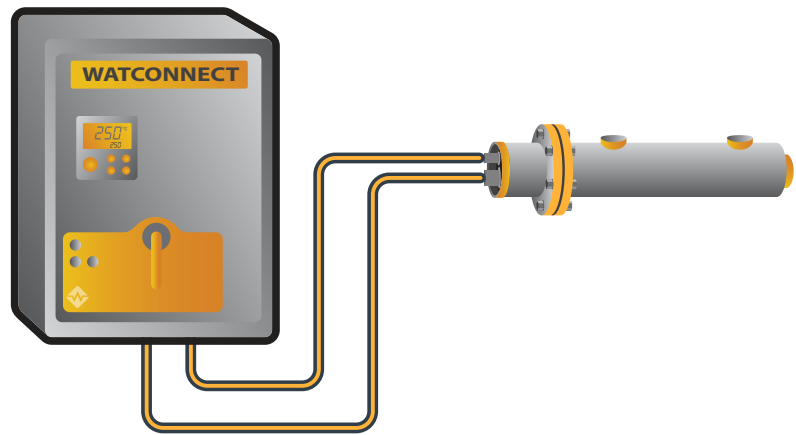


system details:

How many branch circuits are needed between process heater and control panel for North American compliance?

example*:

**2 branch circuits
< or = 48 amps each**



*multiple scenarios apply

Watlow's WATCONNECT C2-C5 control panels are standardized at 48 amps per branch maximum for important reasons:

Regulatory Compliance - see code reference below

- a. National Electric Code - Section 425.22 requires heater to be subdivided with each subdivided load not to exceed 48 amps.
- b. UL® 508A - Section 31.61 requires control panel branch circuit protection not larger than 60 amps and protection not less than 125 percent of the heater load current. Thus, $60 \text{ amps} \times 1/125\% = 48 \text{ amps per branch circuit maximum}$.

Reliability / Redundancy

- a. Watlow's DIN-A-MITE thru wall SCR power controllers utilize an external heat sink to reduce control panel heat rise by approximately 70 percent. Reducing heat extends the life of electronics maximizing reliability and uptime.
- b. In the event of a fault, the affected branch circuit(s) is de-energized leaving the remaining heater branch circuits continuing to provide heat. Thus, multiple branch circuits increase redundancy and uptime.

System Cost Effectiveness

- a. Heater/panel sizing near the regulatory limit of 48 amps per branch circuit can provide lowest system cost. See exception on page 1 for large ASME heater.

reference:

National Electric Code - 2017 Edition

425.22 (B) Resistance Elements. Resistance-type heating elements in fixed industrial process heating equipment shall be protected at not more than 60 amperes. **Equipment rated more than 48 amperes and employing such elements shall have the heating elements subdivided, and each subdivided load shall not exceed 48 amperes.** Where a subdivided load is less than 48 amperes, the rating of the supplementary overcurrent protective device...